

REMARKS

The non-final Office Action was issued on pending claims 1-7. Claims 1 and 4 stand rejected. Claims 2, 3, and 5-7 have been withdrawn from consideration as being directed to a non-elected invention. In this Response, claims 8-11 have been added, and no claims have been amended or cancelled. Thus, claims 1-11 are pending in the application, and claims 1, 4 and 8-11 are under consideration.

Drawings

In Office Action paragraph 1, the drawings were objected to under 37 CFR 1.83(a). Specifically, the drawings were objected to as not showing the etch pit on the top face of the diaphragm.

Applicants respectfully disagree with the drawing objection because the drawings show the top face of the diaphragm and the specification clearly describes the diaphragm top face having etch pits. See the specification at page 11, lines 18-23. Furthermore, the etch pits have a minute size relative to the pressure sensor and diaphragm shown in the drawings. The etch pits have a density of five pits per μm^2 or less. However, Applicants request Fig. 1A be amended per the enclosed substitute sheet of drawings to symbolically show the etch pits. Fig. 1A shows the etch pits 15 as dots on the top face of the diaphragm 9.

The enclosed substitute sheet of drawings contains drawings for Figs. 1A, 1B, and 2. No amendments were made to Figs. 1B and 2.

Thus, Applicants respectfully submit that the objection to the drawings has been overcome.

Amendments to the Specification

The specification has been amended at page 11, lines 18-23 to be consistent with the amendment to Fig. 1A of the drawings. No new matter has been added.

Claim Rejections – 35 USC § 103

In Office Action paragraph 2, claims 1 and 4 were rejected under 35 USC § 103(a) as being unpatentable over Ko (US 5,528,452) in view of Sidner et al. (US 4,993,143). Applicants respectfully disagree.

Claim 1 pertains to a pressure sensor and calls for the concentration of an impurity at the top face of the diaphragm to be equal to or greater than $1 \times 10^{19} \text{ cm}^{-3}$ and less than $9 \times 10^{19} \text{ cm}^{-3}$. Claim 4 also pertains to a pressure sensor and calls for the etch pit density on the top face of the diaphragm being equal to or less than five per μm^2 .

The Office Action acknowledges that Ko does not disclose Applicants' claimed concentration of an impurity at the top face of the diaphragm being equal to or greater than $1 \times 10^{19} \text{ cm}^{-3}$ and less than $9 \times 10^{19} \text{ cm}^{-3}$. The Office Action also acknowledges that Ko does not disclose an etch pit density on the top face of the diaphragm being equal to or less than five per μm^2 .

Turning to Sidner et al., Applicants submit that Sidner et al. also does not disclose or suggest the above-claimed features in claims 1 and 4. Sidner et al. merely discloses that the diaphragm has an impurity concentration of about $2 \times 10^{15} \text{ cm}^{-3}$. The impurity concentration according to Sidner et al. is significantly less than the impurity concentration of the present invention which is $1 \times 10^{19} \text{ cm}^{-3}$ to $9 \times 10^{19} \text{ cm}^{-3}$. Furthermore, Sidner et al. does not concretely describe etch pits in the top face of the diaphragm. Even further, Sidner et al. does not describe Applicants' claimed concentration of etch pits in the top face of the diaphragm. Sidner et al. also does not describe advantages of providing Applicants' concentration of etch pits or concentration of an impurity in the top face of the diaphragm and thus, Sidner et al. does not suggest any modification to achieve Applicants' claimed concentrations.

The Office Action asserts that elements 16, 28 and 32 in Sidner et al. are etch pits. However, elements 16, 28 and 32 are not etch pits in a surface of a diaphragm. Rather, element 16 is a buried cavity formed in the interior of the silicon chip (column 3, lines 21-24; Fig. 1). Element 28 is a moat advantageously having a depth between 5 and 20 microns (column 4, lines 38-42; Fig. 2B). Element 32 is a buried open cavity created by widening the moat 28 to about 20 microns square (column 5, lines 8-13; Fig. 2E). The Sidner et al. elements 16, 28 and 32 are

clearly not surface etch pits but rather are large cavities. Sidner et al. describes the elements 16, 28 and 32 as having sizes significantly larger than Applicants' claimed etch pits.

Moreover, Sidner et al. does not describe or suggest any improvement of durability of the detector by decreasing the etch pit density in the top face diaphragm by controlling the concentration of the impurity of the top face of the diaphragm. Accordingly, there would be no motivation to modify Sidner et al. or Ko to result in Applicants' claimed invention.

Applicants also submit that there is no motivation, teaching or suggestion to combine Ko and Sidner et al. to achieve Applicants' claimed invention.

Thus, Applicants submit that the §103 rejection has been overcome.

New Claims

New dependent claims 8-11 have been added. Claims 8 and 11 are supported by the specification as originally filed at the last line of page 7, and claims 9 and 10 are supported at page 12, lines 22-27. Applicants submit claims 8-11 are also allowable.

CONCLUSION

For the foregoing reasons, Applicants submit that the patent application is in condition for allowance and request a Notice of Allowance be issued.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY 

Michael S. Leonard
Reg. No. 37,557
P.O. Box 1135
Chicago, Illinois 60690-1135
Phone: (312) 807-4270

Dated: January 9, 2004